A health economic evaluation of concomitant surgical ablation for atrial fibrillation  
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**Record Status**  
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

**CRD summary**  
This study examined the cost-effectiveness, for patients with atrial fibrillation, undergoing cardiac surgery, of high-intensity focused ultrasound-assisted surgical ablation, the classic ‘cut and sew’ maze procedure, and subsequent percutaneous ablation, in comparison with drug treatment. The maze procedure or surgical ablation were highly cost-effective and preferable to the percutaneous ablation, which was cost-effective, but to a lesser extent. The study was well conducted and reported and the conclusions appear to be valid.

**Type of economic evaluation**  
Cost-utility analysis

**Study objective**  
The objective was to examine the cost-effectiveness of four strategies for the treatment of atrial fibrillation (AF), whilst undergoing coronary artery bypass graft (CABG) surgery or valve replacement or repair. These strategies were the classical maze procedure, surgical ablation, percutaneous ablation in a subsequent procedure, and non-interventional, drug treatment. The patient population was elderly, with coronary or valvular disease.

**Interventions**  
The strategies were the classic ‘cut and sew’ maze procedure; high-intensity focused ultrasound (HIFU)-assisted surgical ablation; and percutaneous ablation, all concomitant with cardiac surgery. These strategies were compared with non-interventional, drug treatment.

**Location/setting**  
UK/secondary care and hospital.

**Methods**  
Analytical approach:  
This economic evaluation was based on a Markov model with a five-year time horizon. The authors stated that the perspective of the National Health Service (NHS) was taken.

Effectiveness data:  
The clinical data were identified through a literature review of clinical trials in the Medline database. The trials that were selected were those that provided the most appropriate treatment effect data, which could be used without too many adaptations. The authors provided details on the number of patients and the results of the trials selected. The long-term mortality was taken from a prospective cohort study and UK life tables. The key clinical input was the treatment effect and the recurrence rate for AF.

Monetary benefit and utility valuations:  
The utility valuations for AF were based on the European Quality of life (EQ-5D) questionnaire and provided by the European Heart Survey investigators. The utility weights for other health states were taken from a published meta-analysis that used a time trade-off method to elicit preferences.

Measure of benefit:  
Quality-adjusted life-years (QALYs) were used as the summary benefit measure and they were discounted at an annual rate of 3.5%.
Cost data:
The health services were the maze procedure, percutaneous ablation, cardiac death, stroke (acute and follow-up), pacemaker (placement and follow-up), surgical ablation, and drugs for AF. The unit costs and quantities of resources used were presented for most items. These costs were based on NHS official prices and supplemented with data from a few published studies. The resource use data appears to have been based on authors’ assumptions. All costs were in UK pounds sterling (£) and were discounted at an annual rate of 3.5%. The price year appears to have been 2005.

Analysis of uncertainty:
The impact of changes in the key model inputs or authors’ assumptions was tested in a one-way sensitivity analysis. Three scenarios for AF were also considered: permanent, persistent, and paroxysmal AF.

Results
Depending on the AF scenario, the cost per patient ranged from £2,317 to £2,513 with no ablation (non-interventional, drug strategy), from £3,173 to £3,233 with the classic maze procedure, from £4,457 to £4,567 with surgical ablation, and from £5,438 to £5,538 with percutaneous ablation.

The QALYs ranged from 2.5297 to 2.8843 with no ablation, from 3.0658 to 3.1704 with the maze, from 3.0425 to 3.2056 with surgical, and from 2.9593 to 3.1285 with percutaneous ablation.

The incremental cost per QALY gained over no ablation ranged from £1,343 to £3,471 with the maze, from £4,005 to £7,448 with surgical, and from £7,041 to £17,372 with percutaneous ablation.

The sensitivity analysis confirmed that these base-case findings were robust. Even when the incremental cost-utility ratios increased, under unfavourable scenarios, they remained far below the threshold of £20,000 per QALY gained. The key drivers were the cost of the procedures and the utility values associated with AF.

Authors’ conclusions
The authors concluded that the classic maze procedure or HIFU-assisted surgical ablation with a scheduled CABG or valve procedure was highly cost-effective, while percutaneous ablation in a subsequent procedure was also cost-effective, but to a lesser extent. Both the maze procedure and the surgical ablation were cheaper and more effective than the percutaneous ablation.

CRD commentary
Interventions:
The authors justified their selection of the comparators, which appear to have been appropriately chosen to reflect the available treatments for AF.

Effectiveness/benefits:
The approach used to identify all the relevant sources for the evidence was appropriate. The authors provided some key details on the search methods used in the review. The inclusion of clinical trials ensures the validity of the clinical inputs. Furthermore, the authors reported and justified the data extracted from the primary studies as well as the assumptions made to fit these data into the decision model. In general, the clinical analysis was clearly reported. A few details on the derivation of the utility valuations were provided. QALYs are an appropriate benefit measure given the impact of disease on patients’ quality of life and survival.

Costs:
The cost categories and most of their sources reflected the NHS viewpoint. Details on the unit costs and quantities of resources used were presented for some items. However, some costs were reported as macro-categories. Typical NHS sources were used for most of the economic inputs. When published studies were used to derive the costs, details about these economic analyses were provided. The price year and the use of discounting were reported. In general, the economic analysis appears to have been clearly presented.

Analysis and results:
The approach used to combine the costs and benefits was appropriate and well reported. The sensitivity analysis
focused on individual uncertain parameters rather than on the comprehensive issue of uncertainty. The decision model structure and its findings were clearly presented. The authors pointed out that this was the first analysis that assessed the health economic consequences of concomitant surgical ablation for the treatment of AF.

Concluding remarks:
The study appears to have been well conducted and reported. The authors’ conclusions appear to be valid.

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